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Army Service Forces
Quartermaster Corps
CLIMATIC RESEARCH LABORATORY
Lawrence, Massachusetts

DOCUMENT SECTION

Monthly Report - 1 March 1944

CLASSIFICATION CHANGED
TO **UNCLASSIFIED**
AUTH. Letter QMRDW-I
DATE 12 Oct 54

SECURITY OFFICER

Frank B. Rogers

1. Personnel

a. The following officers reported for duty:-

Lieutenant R. O. Morris, QMC
Lieutenant R. G. West, QMC

b. Captain W. D. Allers, MC, was relieved of duty and reported to Camp Edwards, Massachusetts.

2. Reports

The following reports have been sent to the Office of The Quartermaster General for the approval of Colonel G. F. Doriot:-

Report No. 72-C 14 February 1944

Mittens and Gloves

Standard and Experimental

Manual Dexterity

Twelve Tables and Two Figures

Six handgear combinations were studied:-

Mitten Insert and Shell, Trigger-Finger,
M-1941 Combination

Mitten, Insert and Shell, Trigger-Finger,
M-1943 Combination.

Wilkins-Ford Mitten Combination, Experimental.

Washburn Mitten Combination, Experimental.

Flannel Glove with Leather Palm.

Glove, Wool, Insert; Glove, Leather, Shell.

Dexterity with the above handgear was determined by means of the bolt assembly test.

At a temperature of minus 10°F. (-23.3°C.) the M-1941 and the M-1943 mitten combination afforded the wearer approximately equal dexterity. At a temperature of minus 40°F. (-40°C.), however, dexterity was significantly better with the M-1943 mitten, apparently as a result of its increased thermal protection.

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R E S T R I C T E D

Dexterity was greatly reduced when the Wilkins-Ford or Washburn mittens were worn. Of the two, the Washburn afforded considerably greater dexterity than the Wilkins-Ford mitten and shell. The use of either of these mitten combinations should be restricted to conditions in which dexterity is not needed and thermal insulation is at a premium.

Gloves showed only a slight superiority in dexterity over M-1943 mittens. The use of gloves in place of mittens in cold climates, therefore, is condemned. The slight increase in dexterity is outweighed by the loss in thermal insulation resulting from the use of a glove.

The M-1943 mitten is the handgear of choice for combat troops or troops stationed in unusually cold areas.

Report No. 61-A-B 24 February 1944

Bags, Sleeping Mountain, Experimental - Nos. 250 - 255

Thermal Insulation and Utility

Eighteen Tables and Eleven Figures

Five grades of mountain sleeping bags, experimental, were tested. As a substitute for the standard 40-60 mixture of down and feathers, two of the bags were filled with kapok, two with milkweed floss and one with wool batts. One grade of each of the kapok bags contained 46 and 60 ounces of fill; one each of the milkweed floss bags contained 46 and 54 ounces of fill; the fifth bag contained two wool batts, weighing $6\frac{1}{2}$ ounces per square yard of 56s wool. The bulk of the testing of the bags was done prior to laundering. A few observations were made after the bags were laundered according to Quartermaster Specifications No. 24A, 27 May 1942, par. 4.

Fourteen enlisted men acted as subjects in seventy-five individual exposures, totalling 330 testing hours. Exposure temperatures in the cold room varied from minus 20°F. (-23.9°C.) to plus 10°F. (-12.2°C.). Most of the tests were performed at minus 10°F. (-23.3°C.), and 0°F. (-17.8°C.). These temperatures were found to be the critical range for comparison of the several test items. At warmer or colder exposure temperatures the differences between the sleeping bags were very slight.

As in previous sleeping bag studies, the tolerance times proved to be the most reliable criteria for comparable data. The subjects remained in the bags for six hours, unless unbearably cold before the expiration of that period. They wore 50-50 underwear and one pair of ski socks, wool. The bags were placed on one thickness of regular army comforter over a slatted false wooden floor. Body thermocouple harnesses with eight points located over various parts of the body were worn in most experiments. Skin temperatures were recorded every half hour. All subjects were interviewed upon completion of each experiment.

It was observed that both the milkweed floss and the kapok bags decreased progressively in their protection against cold from day to day. This was caused, principally, by the matting and bunching of the fill. In most bags the filling had shifted into the foot of the bag, leaving the torso virtually without any insulation. Such deterioration was particularly evident in the milkweed floss filled bags. Loss in thermal insulation was substantiated by decreased clo values. The original clo values for the experimental bags were similar to those of the standard mountain bag; a significant decrease during use was observed.

Washing the bags according to Quartermaster Specifications affected the fills differently. The kapok bags exhibited a temporary slight improvement in thermal insulation after washing. This was attributed to the method of drying used by the laundry which redistributed the shifted filling. The milkweed floss, on the contrary, showed even greater deterioration. Cubic volume measurements were made before and after washing. Analysis of such measurements showed that the kapok bags increased in volume, while the bags filled with milkweed floss showed yet a further decrease over that recorded before washing.

All bags were weighed on certain of the experimental days before and after exposure. The amount of moisture picked up by the bags during an exposure was believed to have been dependent primarily on the exposure temperature; the colder the temperature, the greater the tendency shown by the subjects to keep their faces within the bag, thus trapping the expired vapor and increasing the weight of the bag. The initial weight of the bags varied from 2500 to 3000 grams.

The new series of experimental bags was compared with the recently tested No. 210 series (chicken feathers and down substituted for waterfowl filling: Report No. 50 A-B). Initially the two groups of bags were similar in many respects. With further testing and deterioration of the new bags the superiority of the No. 210 series became pronounced.

The inferiority of the standard light zippers as compared with the improved models, 7DA and 10DA, was observed. The design, cut of the shoulders and the face opening in these experimental bags were not as comfortable nor as satisfactory as in the standard mountain bag.

The usefulness of tolerance time data as the best criterion of sleeping bag adequacy is discussed. The lack of correlation between the toe temperatures and the duration of tolerance time in these sleeping bag tests brought out the significance of the average torso skin temperature. If a bag is not adequate, usually due to lack of insulation about the torso, the subject is forced to terminate the test, even though the feet do not show critically low skin temperatures.

R E S T R I C T E D

It was concluded that none of the three suggested substitutes should be used in the present state. Milkweed floss and kapok are of little value for a bag that is designed for continuous use over a period of time. If a bag were to be used for only a few nights and then discarded or replaced, either fill would provide protection down to minus 10°F. Wool batts might be suitable if shrinkage during washing could be prevented.

One report was prepared for local distribution only:-

Some Physical Considerations of the Performance of Cold

Weather Clothing

Modification and Amplification of Paper by Lt. Col. T. F. Hatch,
Army Ground Force Medical Research Laboratory

One Table and Two Figures

3. In the Daily-Provisional Reports during the past month, tests on the following items were discussed:-

Bags, Sleeping, Wool, Experimental
Pile Clothing, Experimental
Pile Clothing, Standard
Footgear, Seven Types of Cold Climate
Handgear, Gloves and Mittens
Socks, Felt

4. The Fourth Meeting on Handgear was held 12 February 1944. The following presented papers:-

Mr. Marvin Van Dilla, Climatic Research Laboratory
Lt. Phillips Brooks, Wright Field
Dr. D. R. Griffin, Harvard Fatigue Laboratory
Dr. H. C. Bazett, University of Pennsylvania
Lt. C. R. Spealman, Naval Medical Institute
Dr. S. Margolin, Fort Monmouth

5. A field trip was held on the summit of Mount Mansfield, Vermont, 13 to 20 February 1944. Rigorous climatic conditions were encountered which included temperatures as low as minus 21°F., high wind velocities and thirty inches of new snow and five feet of top snow. Cold Climate and Arctic gear, and Rations were tested.

JOHN H. TALBOTT
Lt. Col., MC
Commanding